COURSE GUIDE

BEd SCIENCE

BIO 231 HISTOLOGY OF ANIMALS

University of Education, Winneba
Department of Science Education

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Acknowledgements

The University of Education, Winneba, Department of Science Education wishes to thank those below for their contribution in this Course Guide:

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About this Course Guide

Histology of mammals has been has been produced by The University of Education, Winneba. All Course Guide as produced by University of Education, Winneba are structured in the same way, as outlined below.

How this Course Guide is structured

The course guide overview

This course is intended to expose you to the techniques used in studying animal tissues.

The course overview gives you a general introduction to the course. Information contained in the course overview will help you determine:

- If the course is suitable for you, register online with the Department's officer
- What you will already need to know. You will be required to pass Bio 111
- How much time you will need to invest to complete the course.
- The overview also provides guidance on:

What you can expect from the course.

- Study skills.
- Where to get help.
- Course assignments and assessments.
- Activity icons.
- Units.

We strongly recommend that you read the overview *carefully* before starting your study.

The course content

The course is broken down into lessons. Each lesson comprises:

- An introduction to the lesson content.
- Lesson Objectives or outcomes .
- New terminology.
- Core content of the lesson with a variety of learning activities.
- A lesson summary.
- Assignments and/or assessments, as applicable.

Resources

For those interested in learning more on this subject, we provide you with a list of additional resources at the end of this Course Guide these may be books, articles or web sites.

Your comments

After completing course we would appreciate it if you would take a few moments to give us your feedback on any aspect of this course. Your feedback might include comments on:

- Course content and structure.
- Course reading materials and resources.
- Course assignments.
- Course assessments.
- Course duration.
- Course support (assigned tutors, technical help, etc.)

Your constructive feedback will help us to improve and enhance this course.

Course overview

Welcome to BIO 231 Histology of Animals. This course begins with a discussion on the techniques of histology.These include dissociation, fixation, embedding,sectioning, staining and mounting.Then it examines the four principal types of body tissues as they appear histologically

Course outcomes

Outcomes

Upon completion of this course you will be able to:

1. *Use the techniques of histology to study animal tissues*
2. *Classify the tissues of the body into four principal types*
3. *Give distinguishing characteristics of each typeAA*

Timeframe

How long?

Fourteen weeks

Lesson 1 – Histological Techniques

PUT COURSE CONTENT HERE AND CAN USE THE FOLLOWING IDEVICES

 Activity	 Assessment	 Assignment	 Case study
 Discussion	 Group activity	 Help	 Note it!
 Outcomes	 Reading	 Reflection	 Study skills
 Summary	 Terminology	 Time	 Tip

Outcomes

Upon completion of this unit you will be able to:

Learning objectives:

1. Define these terms in writing :Histology,dissociation,fixation,embedding,dehydration,clearing,sectioning staining, and mounting
2. Apply the techniques of histology to stain and mount cells.

Terminology

PUT YOUR TERMINOLOGIES HERE

Histology

Dissociation

Fixation

Embbeding

Clearing

Sectioning

Staining

Unit summary

Summary

HISTOLOGY

Basically refers to the study of tissues and sometimes the general study of cells and organ systems. In histology emphasis is placed on structure and function of tissues, cells and organs. Histology requires the use of the microscope. Histology studied at the microscopic complements the study of gross anatomy; It also provides the structural basis for the study of physiology.

HISTOLOGICAL TECHNIQUES

Methods used for the preparation of tissues for microscopic study. Tissues can be examined:

i. In the living condition

ii. When they are dead

Living tissues are more difficult to handle and are valuable for a short period only. The structure and function may be studied simultaneously because may be seen to move to ingest foreign material occasionally to divide and to carry on other functions. Thus, methods employed differ from fixed cells. Dead tissues are much easier to examine. However, a tissue must be as closed as possible to living conditions. The following processes are used in preparing dead tissues for microscopic work.

Dissociation: It is applied to cells which are grouped into a solid mass. The cells are separated with a fluid. The objective is to obtain a thin layer thin enough for microscopic examination. For example, smearing of blood cells on micro slide.

Fixation: Chemicals are applied to tissues to preserve protoplasm in with the least alterations from the living state. This is ossible because fixatives kill the cells rapidly so that degeneration is inhibited either by autolytic changes or by bacteria growth. Tissues to be fixed must be as fresh as possible and the fixative must penetrate the tissues properly before any degeneration sets in.

Functions of fixatives

They harden tissues making them suitable for sectioning.

It also makes it possible for tissues to withstand exposure to reagents of different osmotic strengths.

It also aids optical differentiation of cells and other constituents of tissues.

Some of the reagents used include formaldehydes, ethyl alcohol, mercury-bichloride, acetic acid, potassium-bichromate, picric acid. No single fixative is able to fix all the cells and tissue components, and usually several reagents are combined. For example, Bouin's reagent, Zenkers' fluid and Sousa's fluid.

Alcohol shrinks or hardens cells. Acetic acid penetrates the cells to kill and cause swelling. Thus, a reagent may have a combination of the two chemicals. The choice of fixative is determined by the type of tissue and the staining method to be used.

Embedding

The purpose of embedding is to provide rigid support to the tissue block so that they may be cut into thin sections. The tissue is put in a medium (paraffin wax in a liquid state) and allowed to solidify by cooling. This makes it easier for thin sectioning. Before embedding, the following treatments are applied to the tissue:

i. Washing. It is done to remove excessive fixative using distilled water.

ii. Dehydration: The tissue is passed through increasing strength of ethylalcohol or some other dehydrating agent. This allows for gradual shrinking of the tissue or gradual removal of water from the tissue.

Why dehydration?

To reduce shrinkage due to rapid loss of water.

To prevent decay or degeneration of tissue.

To appear the appearance of the tissue.

To allow mountain medium to infiltrate tissue properly.

Proper embedding of tissue and sectioning.

iii. Clearing: Removal of the dehydrating agent and its replacement by some fluid which is miscible both with the dehydrating agent and with the embedding medium. Examples are xylene, chloroform, benzene, ceder wood oil, toluene, clove oil. Clearing is done to eliminate the alcohol from the tissue. It increases the refractive index. It improves on the infiltration of mountant. It prevets fading of the stained material

Sectioning: It refers to embedded tissues sliced into very thin pieces. The sections are done using a microtome. The sections for microscopic work are between 3-10 μm thick. Sections cut are transferred to a clean microscopic slide on which a little egg albumen has been smeared
To prevent section falling off. Water is run under the section and the slide placed on a warming stage. The water evaporates and the section settles unto the glass suface to which it becomes attached. The mounted section is now ready for staining.

Staining It is the application of coloured organic compound into tissues. The stain renders the part of the tissue or organ more distinct. This is possible because the different parts may be coloured differently by dyes or the different parts may be stained with different dyes. Most stains are employed in aqueous solutions. To stain a paraffin section, place the

section in a paraffin solvent, for examples xylol, totuol. The section is then passed through decreasing strength of alcohol before staining.

Mounting: This refers to placing he specimen on the slide for examination. After staining, excess dye is removed by washing with water or alcohol depending upon the solvent of the dye. The section is dehydrated ascending grades of alcohol. Clearing is also done. After removal from the clearing agent, a drop of mounting medium which has a refractive index similar to that of glass is placed on the section. The preparation is covered with a cover slip and allowed to dry on a dish warmer.

Temporary and Permanent Preparation
Mounting could be temporary and permanent. For temporary preparation, the following processes are involved: Fixation, staining and mounting Common mountants include glycerine and water. Permanent preparations involve fixation, staining, dehydration, clearing and mounting. Mountants include Canada balsam mixed with xylol and DPX (Synthetic).

Staining Procedure

Xylene I
Xylene II — Dewaxing 2mins

Absolute Alcohol I
Absolute Alcohol II
90% Alcohol
80% Alcohol — Rehydration 2mins

Haemotoxylin First stain 10-15 mins (deep blue)

Running tap water blueing to remove excessive stain 10-15 mins to remove excess stain

Distilled water rinses (few drops)

95%

2nd stain -5m (counter stain)

Absolute alcohol I
Absolute Alcohol II — dehydrate

Xylene — clear the alcohol

Xylene II

—

Assignment

Assignment

Put your Assignment here

Assessment

Assessment

Put your Assesment here

Lesson 2 – Types of Translation

PUT COURSE CONTENT HERE AND CAN USE THE FOLLOWING IDEVICES

 Activity	 Assessment	 Assignment	 Case study
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 Summary	 Terminology	 Time	 Tip

Upon completion of this unit you will be able to:

Outcomes

- *Put your outcomes*

Terminology

PUT YOUR TERMINOLOGIES HERE

Unit summary

Summary

Put your Summary here

Assignment

Assignment

Put your Assignment here

Assessment

Assessment

Put your Assesment here